REMARKS

Claims 1-3, 10, 12, 13 and 16-18 are pending in this application. By this Amendment, claims 1, 10 and 16-18 are amended. Support for the amendments to these claims can be found, for example, in original claims 1 and 10 and paragraphs [0052] and [0053] of the instant specification. No new matter is added. The amendments are made solely to improve the clarity of the claims. In view of the foregoing amendments and following remarks, reconsideration and allowance are respectfully requested.

Entry of the amendments is proper under 37 CFR §1.116 since the amendments: (a) place the application in condition for allowance for the reasons discussed herein; (b) do not raise any new issue requiring further search and/or consideration as the amendments do not alter the scope of the claims; (c) do not present any additional claims without canceling a corresponding number of finally rejected claims; and (e) place the application in better form for appeal, should an appeal be necessary. The amendments are necessary and were not earlier presented because they are made for clarity in response to arguments raised in the final rejection. Entry of the amendments is thus respectfully requested.

Rejection under 35 U.S.C. § 103

A. Tastu and Ashley

The Office Action rejects claims 1-3 under 35 U.S.C. §103(a) over U.S. Patent 4,769,073 to Tastu ("Tastu") in view of European Patent 444470 A1 to Ashley ("Ashley"). Applicants respectfully traverse the rejection.

Claim 1 recites "[a] sol comprising particles dispersed in a medium, wherein: the particles comprise as a main component crystalline cerium oxide of cubic system and as an additional component a lanthanum compound, neodymium compound or a combination thereof; the additional component is contained in an X/(Ce + X) molar ratio of 0.005 to 0.15 in which X is lanthanum atoms, neodymium atoms or a combination thereof; the particles

have a particle size of 50 to 150 nm; the particles have a specific surface area of 2 to 200 m^2/g; and the sol has a pH of 3 to 6 or 8 to 10" (emphasis added). Tastu and Ashley do not teach or suggest such a sol.

The Office Action asserts Tastu discloses a mixture of cerium oxide and a lanthanide salt. The Office Action concedes that Tastu fails to teach or suggest the specific surface area of particles recited in claim 1, but asserts that Ashley discloses a ceria composition including one or more La, Nd or Y having a surface area of greater than 20 m^2/g. Notwithstanding these assertions, Tastu and Ashley would not have rendered obvious the sol of claim 1.

Claim 1 is directed to <u>a sol</u>. A sol can be defined, for example, as a colloidal solution in which solid particles are stably dispersed within a liquid. *See, e.g.,* "Colloid," http://Encarta.msn.com (attached hereto). The Office Action refers to two "admixtures" in Tastu. The first "admixture" referred to in the Office Action is a mixture of ceric oxide and rare earth oxides. *See* Tastu, column 7, lines 19 to 39. This first mixture is a <u>dry mixture</u> -- the result of drying and calcining. There is no teaching or suggestion that this first mixture could or should be the form of a sol. The second "admixture" referred to in the Office Action is a solution of a cerium salt and a rare earth salt. See Tastu, column 4, lines 14 to 29. This second mixture is a <u>solution</u>. There is no teaching or suggestion that this second mixture includes cerium oxide, or that the solution could or should take the form of a sol. A dry mixture is not a sol, and a solution of salts is not a sol. There simply is no teaching or suggestion in Tastu of a <u>sol</u> including particles having as a main component crystalline cerium oxide and as an additional component a lanthanum compound, neodymium compound or a combination thereof.

The Office Action correctly points out that Ashley discloses a high-surface area ceria composition including lanthanum, neodymium or yttrium. *See* Ashley, Abstract; page 4, lines 14 to 46 (Example 1). However, as with Tastu, Ashley discloses a <u>solution</u> of a <u>ceria salt,</u>

which is subsequently calcined to obtain a dry mixture including ceria and lanthanum. Neither the salt solution nor the dry mixture of Ashley is a sol including particles having as a main component crystalline cerium oxide and as an additional component a lanthanum compound, neodymium compound or a combination thereof.

Moreover, even if the ceria oxides obtained by the methods disclosed in Tastu and Ashley were combined with an aqueous medium, one of ordinary skill in the art would not expect to obtain a sol -- a colloidal solution in which the ceria particles are stably dispersed in the aqueous medium. Rather, one of ordinary skill in the art would expect a slurry -- a mixture in which agitation would be required to keep the ceria particles suspended in the aqueous medium. The sols of the present invention are formed, for example, low temperature heating and air oxidation -- not by high-temperature calcining, as in Tastu and Ashley. As a result, as indicated in the instant specification, for example, the lanthanum and neodymium components of ceria particles in exemplary sols according to the present invention are in the form of oxides or hydroxides, which are believed to bond with ceria via an oxygen atoms. *See, e.g.,* instant specification, paragraph [0045]. It is through this bonding and the associated presence of hydroxyl groups on the surface of particles that the various characteristics recited in claim 1 are achieved, leading to high dispersion stability of the particles. *See, e.g.,* instant specification, paragraph [0089]; FIG. 3. This high dispersion stability would not be expected from the particles disclosed in Tastu and Ashley. Because the sol of the present invention has a high dispersibility, it is particularly useful as a polishing agent for semiconductors.

As Tastu and Ashley fail to teach or suggest a sol including particles having as a main component crystalline cerium oxide and as an additional component a lanthanum compound, neodymium compound or a combination thereof, the combination of references fails to teach or suggest each and every feature of claim 1.

Claim 1 would not have been rendered obvious by Tastu and Ashley. Claims 2 and 3 depend from claim 1 and, thus, also would not have been rendered obvious by Tastu and Ashley. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

B. Tastu, Ashley and Aozasa

The Office Action rejects claims 10, 12, 13 and 15-18 under 35 U.S.C. §103(a) over Tastu and Ashley in view of U.S. Patent 6,171,572 B1 to Aozasa ("Aozasa"). Applicants respectfully traverse the rejection.

Claim 10 is directed to an abrasive comprising a sol having features similar to the features of the sol of claim 1. Accordingly, Tastu and Ashley fail to teach or suggest the abrasive of claim 10 for at least the reasons discussed above. Aozasa does not remedy the deficiencies of Tastu and Ashley.

The Office Action correctly points out that Aozasa discloses a ceria sol having a particle size of from 3 to 100 nm, which is combined with, e.g., lanthanum and neodymium. *See* Aozosa, column 3, lines 39 to 54. However, these components are combined in a mixture, which is subsequently precipitated and calcined. That is, Aozosa fails to teach or suggest that a sol including particles having as a main component crystalline cerium oxide and as an additional component a lanthanum compound, neodymium compound or a combination thereof, is formed at any point in the disclosed reaction. The only products in the reaction of Aozosa that could potentially include both cerium oxide and lanthanum and/or or neodymium are not in a sol -- they are in a precipitate or a dry mixture.

As Tastu, Ashley and Aozasa fail to teach or suggest a sol including particles having as a main component crystalline cerium oxide and as an additional component a lanthanum compound, neodymium compound or a combination thereof, the combination of references fails to teach or suggest each and every feature of claim 10.

Claim 10 would not have been rendered obvious by Tastu, Ashley and Aozasa. Claims 12, 13 and 16-18 depend from claim 10 and, thus, likewise would not have been rendered obvious by Tastu, Ashley and Aozasa. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-3, 10, 12, 13 and 16-18 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

James A. Oliff
Registration No. 27,075

Jacob A. Doughty
Registration No. 46,671

JAO:JAD/nab

Attachment:
"Colloid" Article

Date: June 12, 2006

OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

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Colloid

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Colloid

Colloid, suspension of tiny particles of one substance, called the dispersed phase, in another phase, called the dispersion medium. The particles are so small that they remain in suspension indefinitely, unaffected by gravity.

Both the suspended, or dispersed, phase and the dispersion medium may be solid, liquid, or gaseous, although the dispersal of one gas in another is not known as colloidal dispersion. An aerosol is a colloidal dispersion of either a solid colloid (such as cigarette smoke) or a liquid (such as insecticide spray) in a gas, the air. An emulsion is a colloidal dispersion of liquid particles in another liquid; mayonnaise, for example, is a suspension of tiny globules of oil in water. A sol is a colloidal suspension of solid particles in a liquid; paints, for example, are a suspension of minute solid pigment particles in an oily vehicle. A gel is a sol in which the suspended particles are organized in a loose, but definite three-dimensional arrangement, giving some rigidity and elasticity to the mixture, as in jellies.

The particles of a true colloidal dispersion are so small that the incessant bombardment of the molecules of the medium is sufficient to keep the particles in suspension; the random motions of the particles under the influence of this molecular bombardment is called Brownian motion. If, however, the force of gravity is greatly increased in a high-speed centrifuge, the suspension can be broken and the particles made to settle.

Colloidal dispersions in liquids are produced industrially by intensive grinding of a solid in a colloid mill or by intensive mixing and whipping of two liquids together in an emulsifier; wetting of the suspended phase is aided by the addition of a wetting agent known as a stabilizer, a thickener, or an emulsifying agent.

The movement of colloidal particles through a fluid under the influence of an electric field is known as electrophoresis. One method of electrophoresis, devised in 1937 by the Swedish biochemist Arne Tiselius, is used to study proteins and blood serums and to diagnose diseases that cause abnormalities of blood serum.

Because of their size, colloidal particles can pass through ordinary filters, but not through the extremely fine openings in a semipermeable membrane, such as parchment. A liquid cannot flow through a semipermeable membrane, but will diffuse through it slowly if liquid is on the other side. Although a colloidal dispersion cannot be purified by filtration, it can be dialyzed by placing it in a semipermeable bag with pure water on the outside. Dissolved impurities then gradually diffuse through the bag, while the colloidal particles remain imprisoned within it. If the process of dialysis is carried to completion, the suspension will often break down, or settle, because the stability of colloidal systems frequently depends on the electrical charges on the individual particles, and these are in turn generally dependent on the presence of dissolved electrolytes.

Although individual colloidal particles are too small to be seen with an ordinary microscope, they can be made visible by means of an ultramicroscope, or dark-field microscope. If a colloidal dispersion is placed under a microscope and a beam of light is directed through from one side, the path of the beam becomes visible by scattering from the colloidal particles. This same phenomenon makes the path of a beam of light visible in a darkened room, but under the microscope separate flashes of light are observed. The particles are seen to be in random motion as the result of Brownian motion, and their speed is exactly that calculated for molecules the size of the colloidal particles. The particles are directly visible in an electron microscope.

Contributed By:
Seymour Z. Lewin, M.S., Ph.D.
Professor of Chemistry, New York University.